MENU

IMAGINARY

PRACHT EN KRACHT VAN WISKUNDE

REIZENDE TENTOONSTELLING OVER ZICHTBARE EN ONZICHTBARE WISKUNDE

LEES MEER

Exhibition

posters

Interactive software

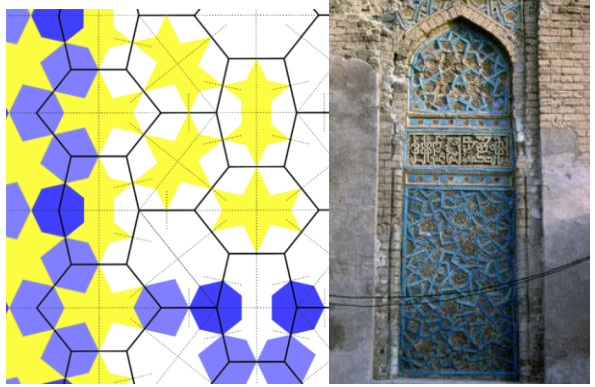
objects

symmetry

Morenaments, wallpaper patterns

Mosaics/tiles

Mosaics

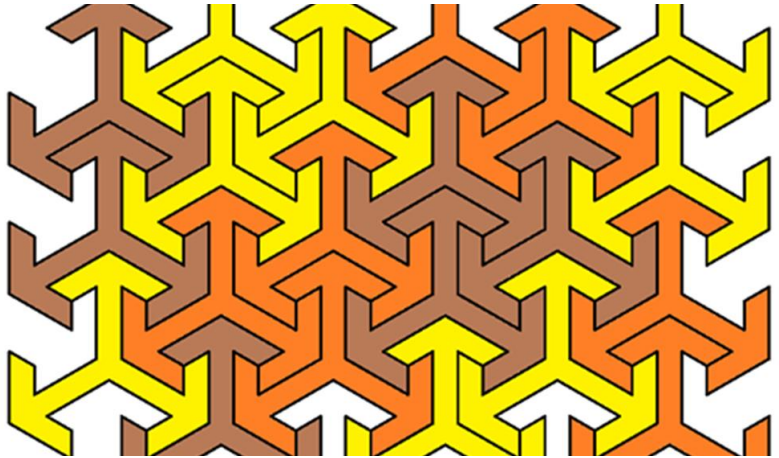


You see several tiles on the tables. First, I want to invite you all just to just play with them for 10 minutes.

What do you see?

What questions arise?

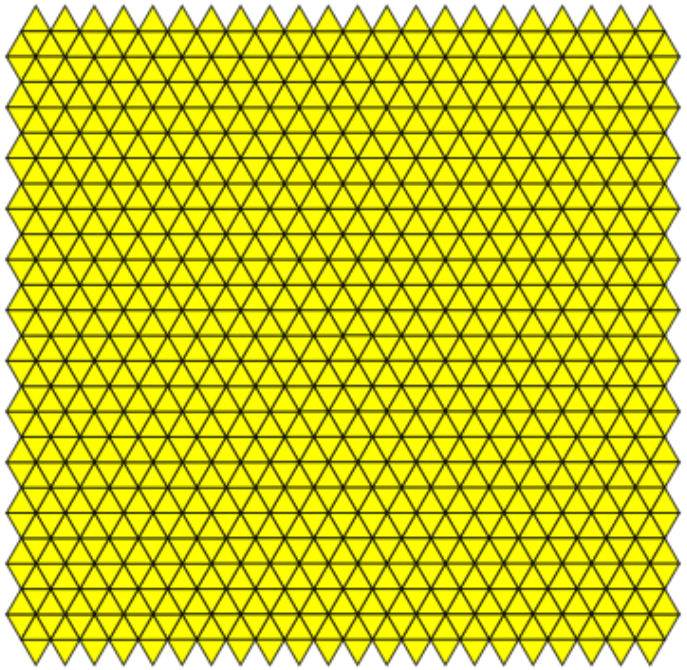
What answers have you already found?

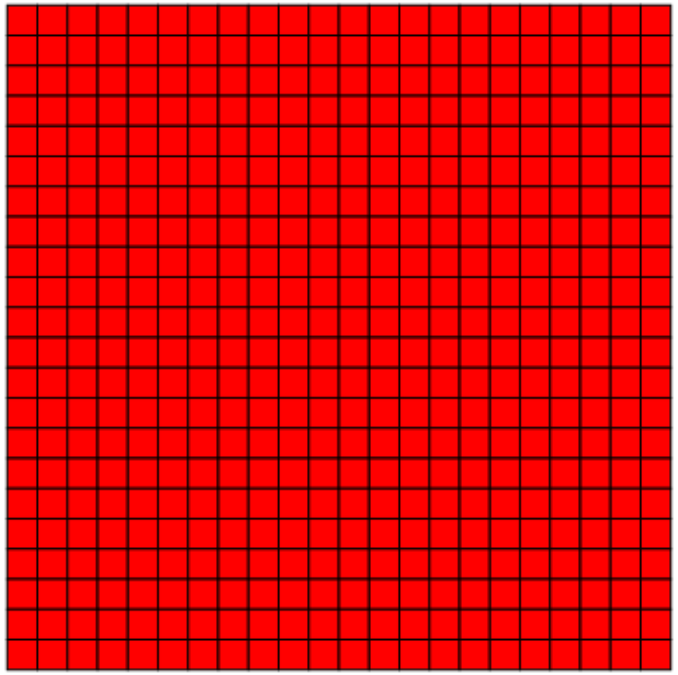


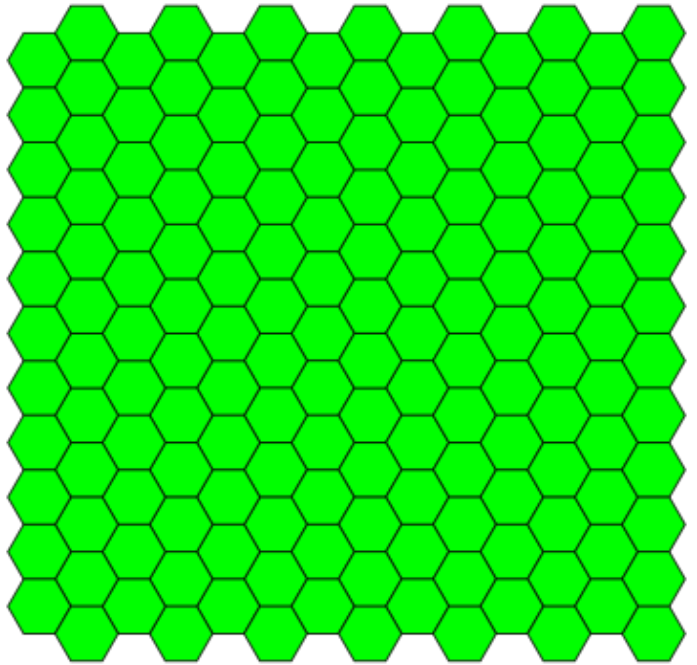
Tessalations

- What makes the tiling a tessalation?
- Can you make a tessellation of all kinds of shapes? So no holes, no open spaces, no overlap

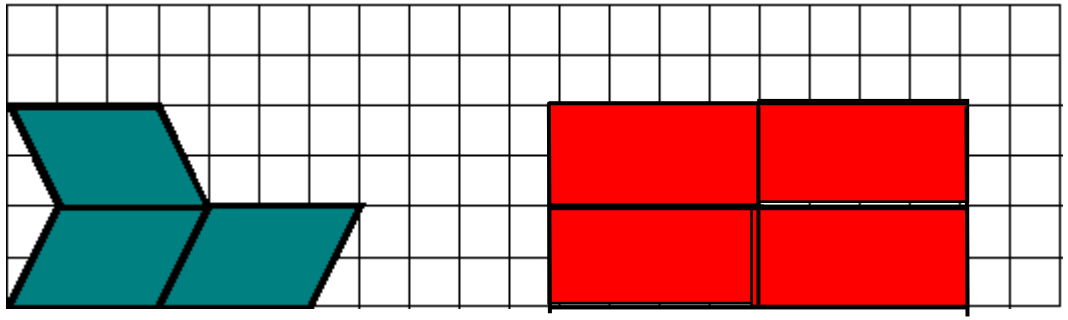
regular identical polygons



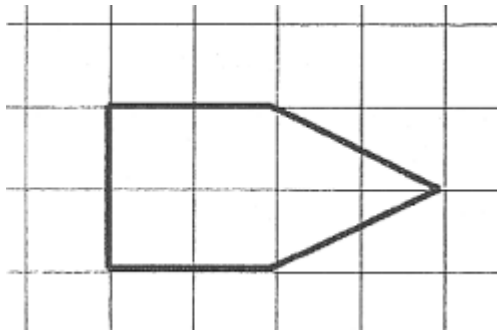


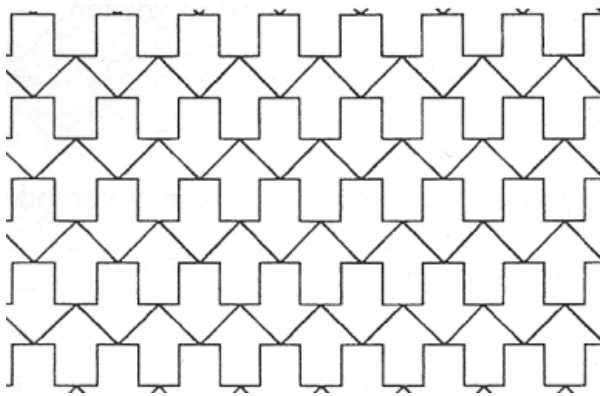


~~regular~~ identical polygons



Can you find a grid existing of pentagons, or heptagons?





Basis for lots of creativity

For instance the famous Escher tessalations

Deleted, picture MC Escher flying birds

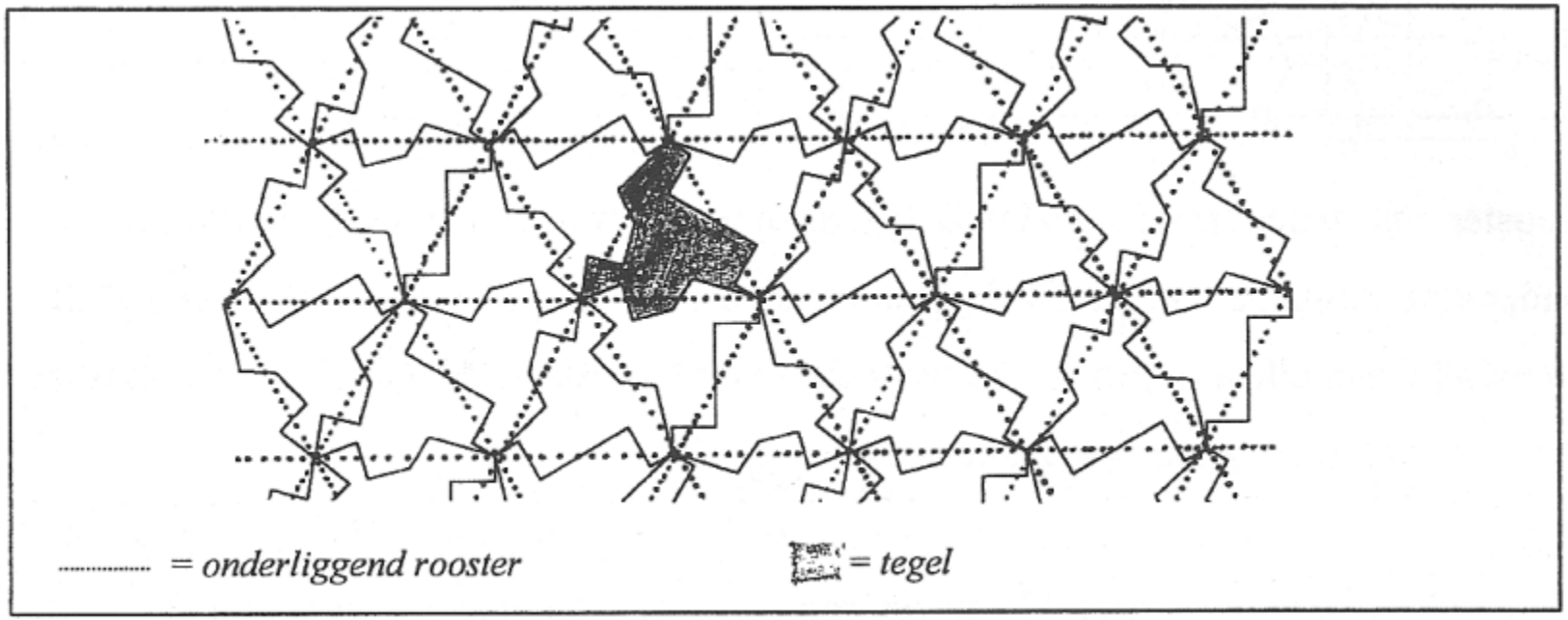
Intermezzo (handout, p1)

- Can you find the underlying grids in the Escher prints?

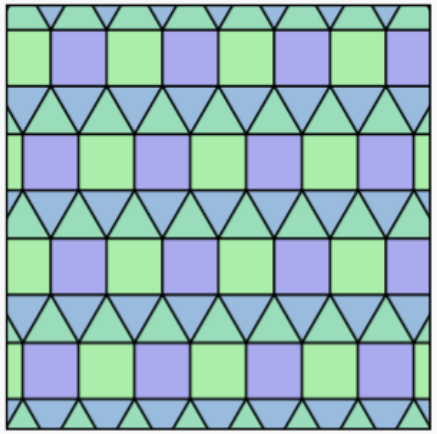
You look for the vertices in the drawing where several figures meet. At one of those figures you walk along the entire figure looking for other points where multiple figures meet. If you connect those points you get the underlying grid

- How can you work out an Escher pattern based on one of the basic polygons?

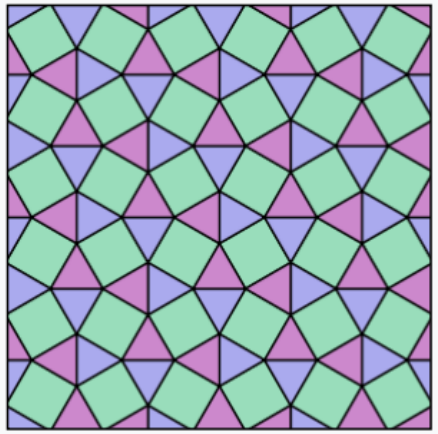
Variations of regular tessalations



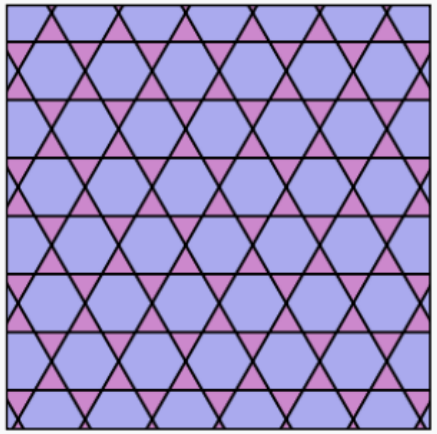
regular ~~identical~~ polygons



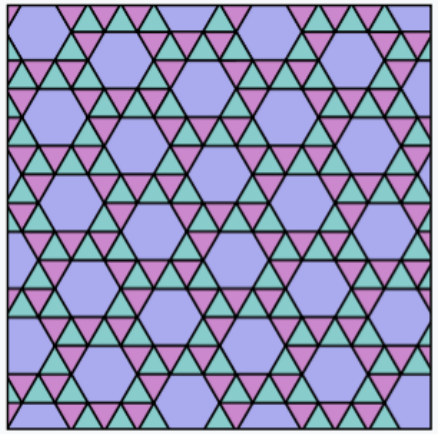
3.3.3.4.4



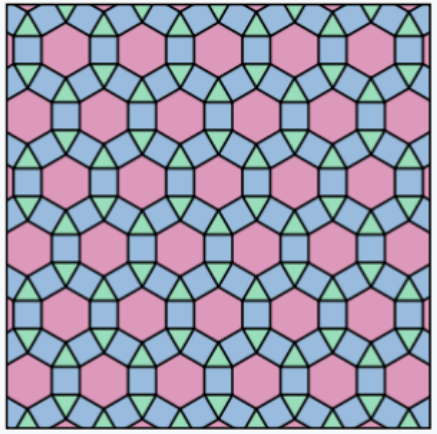
3.3.4.3.4

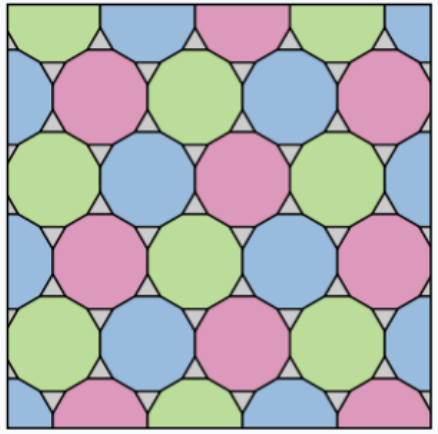


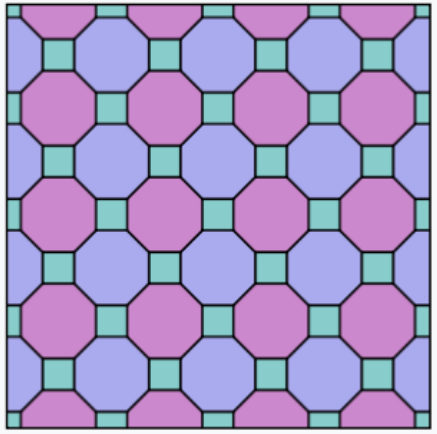
3.6.3.6

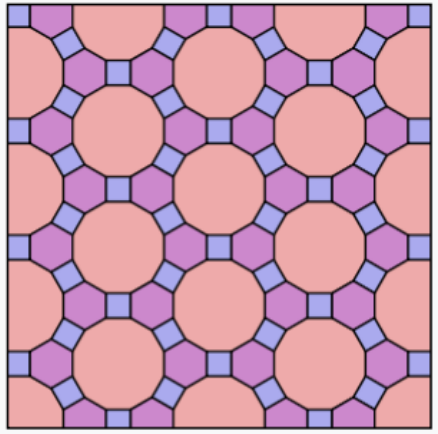


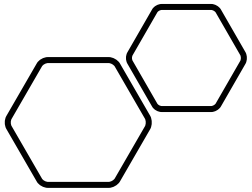
3.3.3.3.6 twee gespiegelde varianten



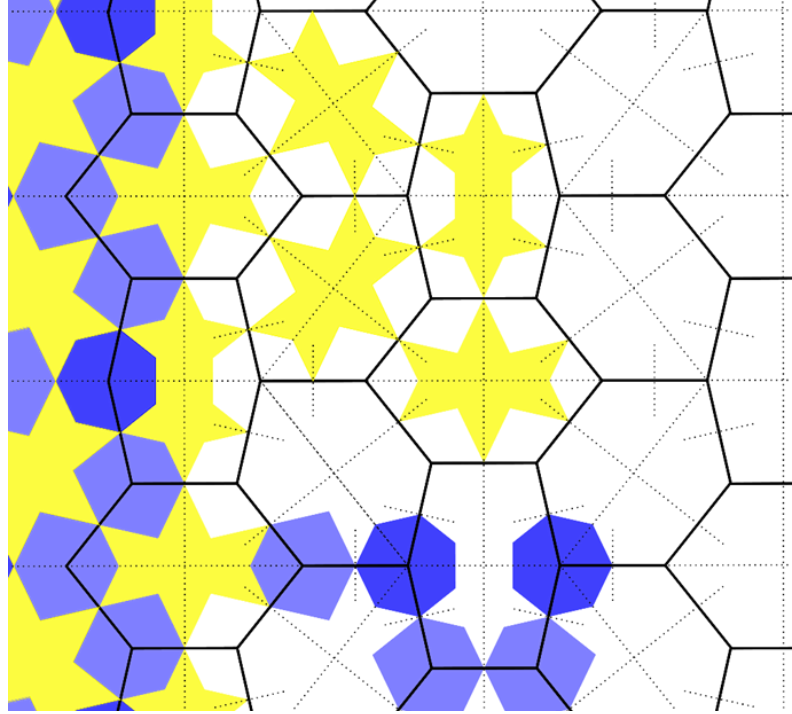


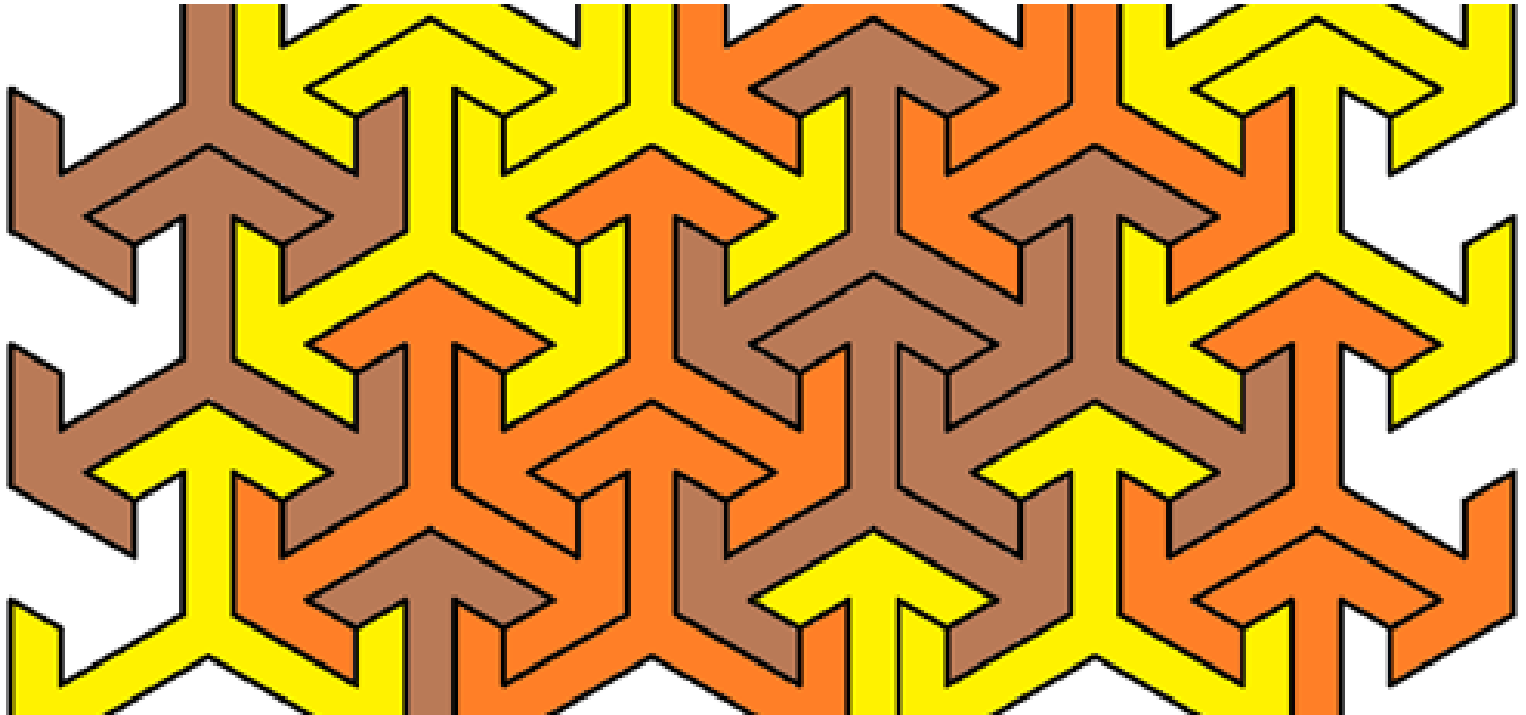






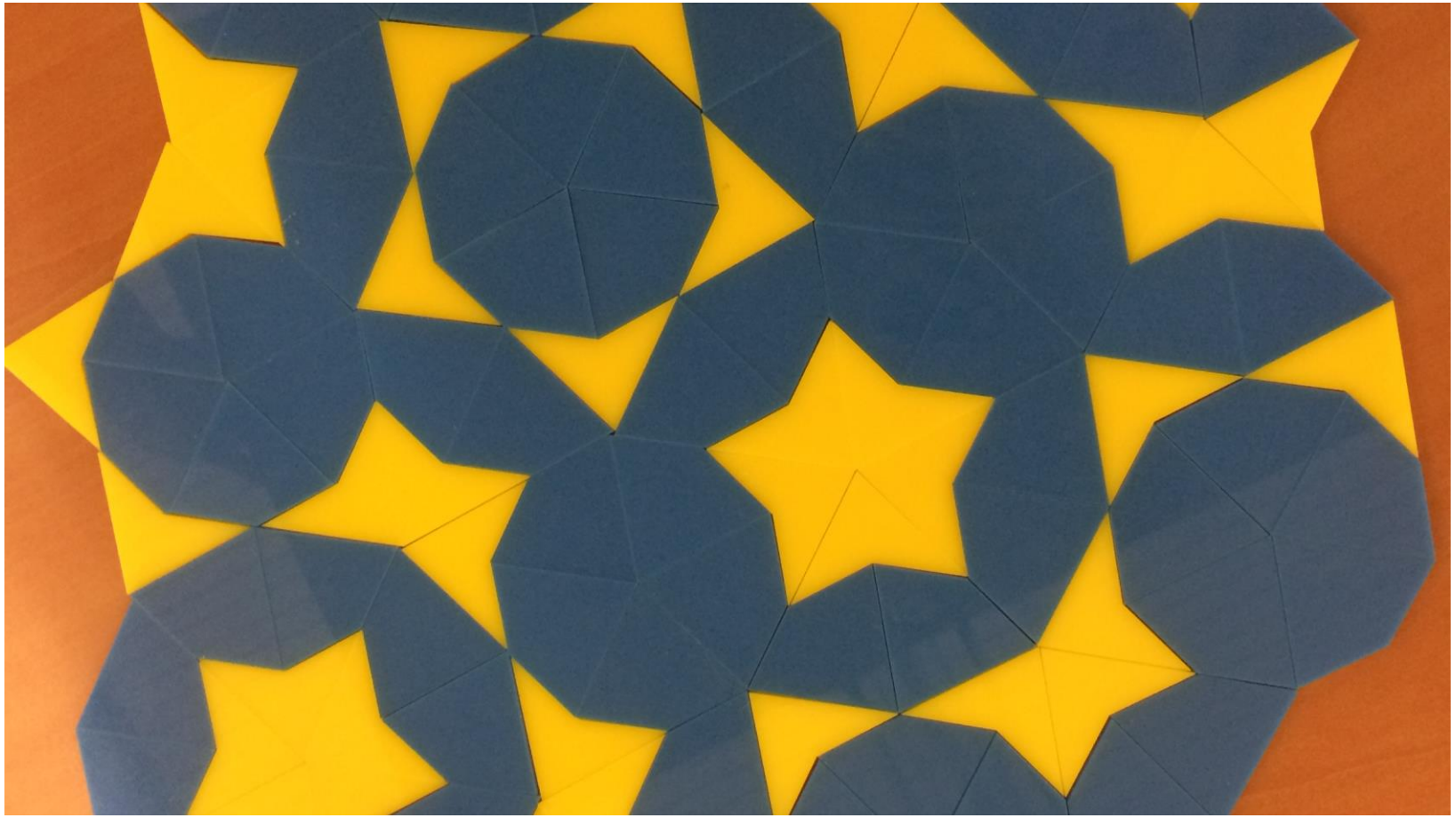
…. And more polygons…





Penrose is a tessalation is special

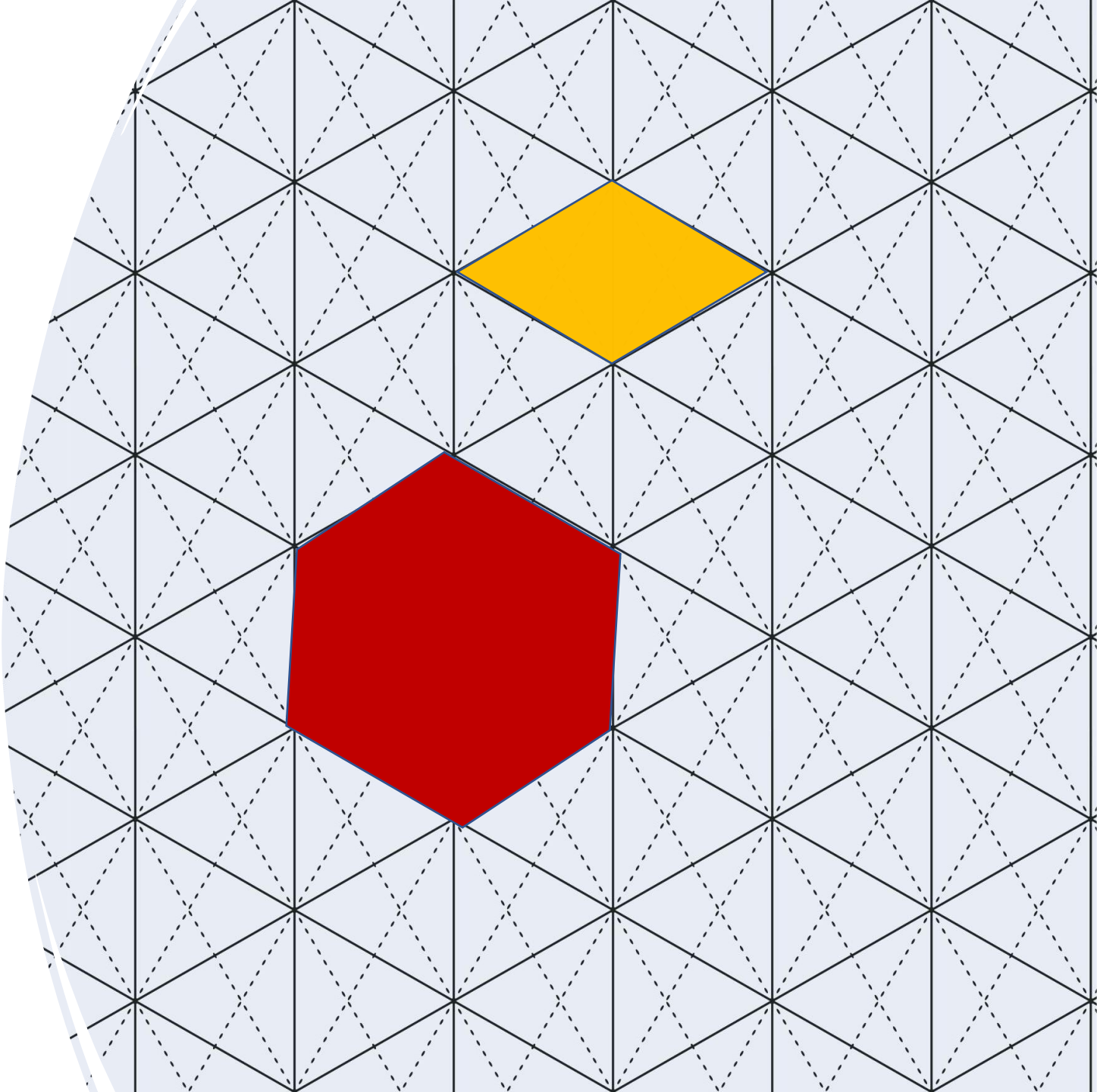
it is called semi-periodic



Periodic tessalations

- Base is a grid consisting of hexagons, triangles, rhombus, or rectangles, squares

- Tessalation can be formed by translation of *symmetric* shapes



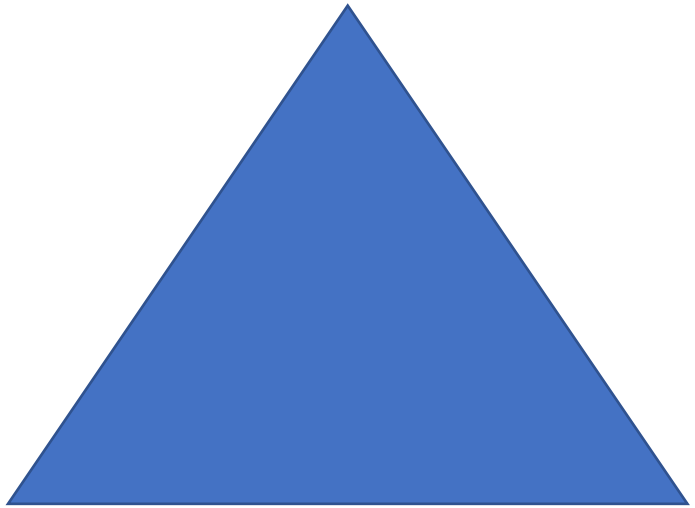
Symmetry

Transformation where the figure is projected on itself

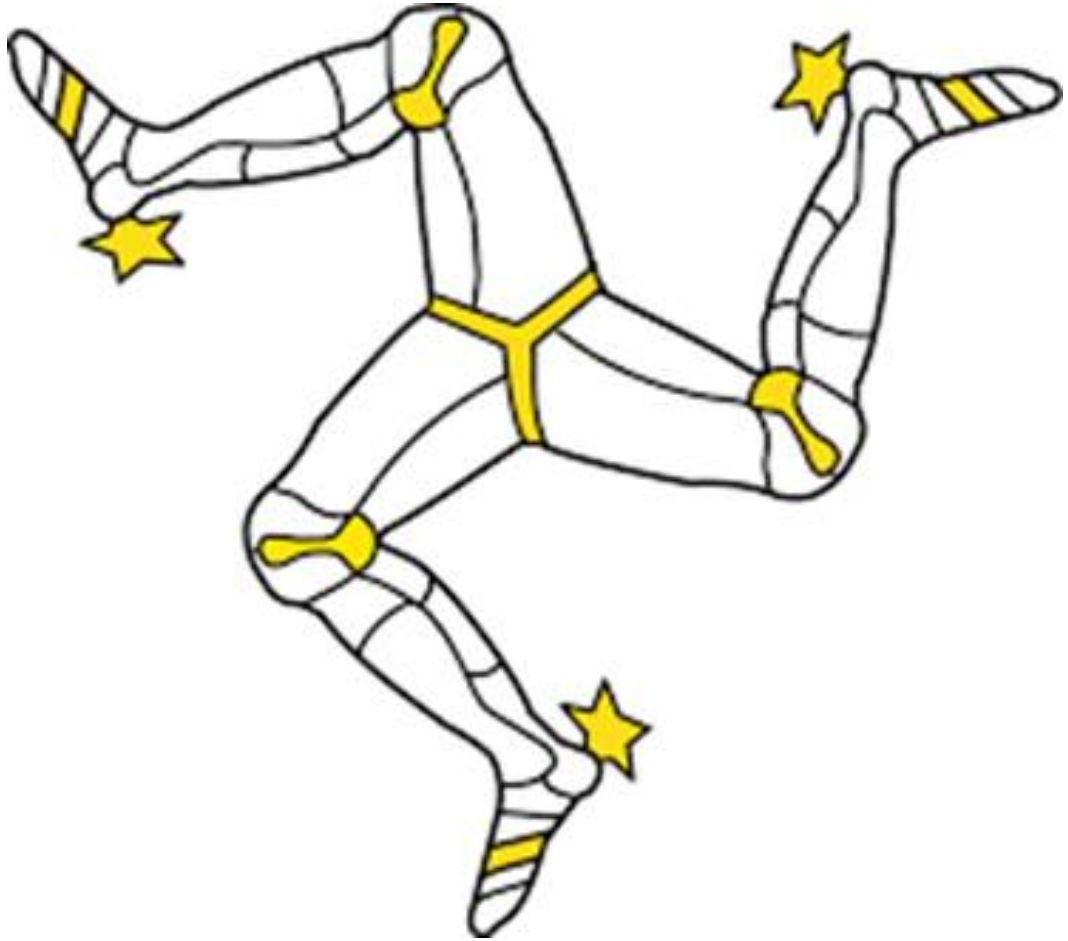
Examples of symmetry:

3 reflections

Two rotations



symmetry



Glide reflection

Glide reflection or translation?

Picture Horsemen by MC Escher

Wallpaper patterns

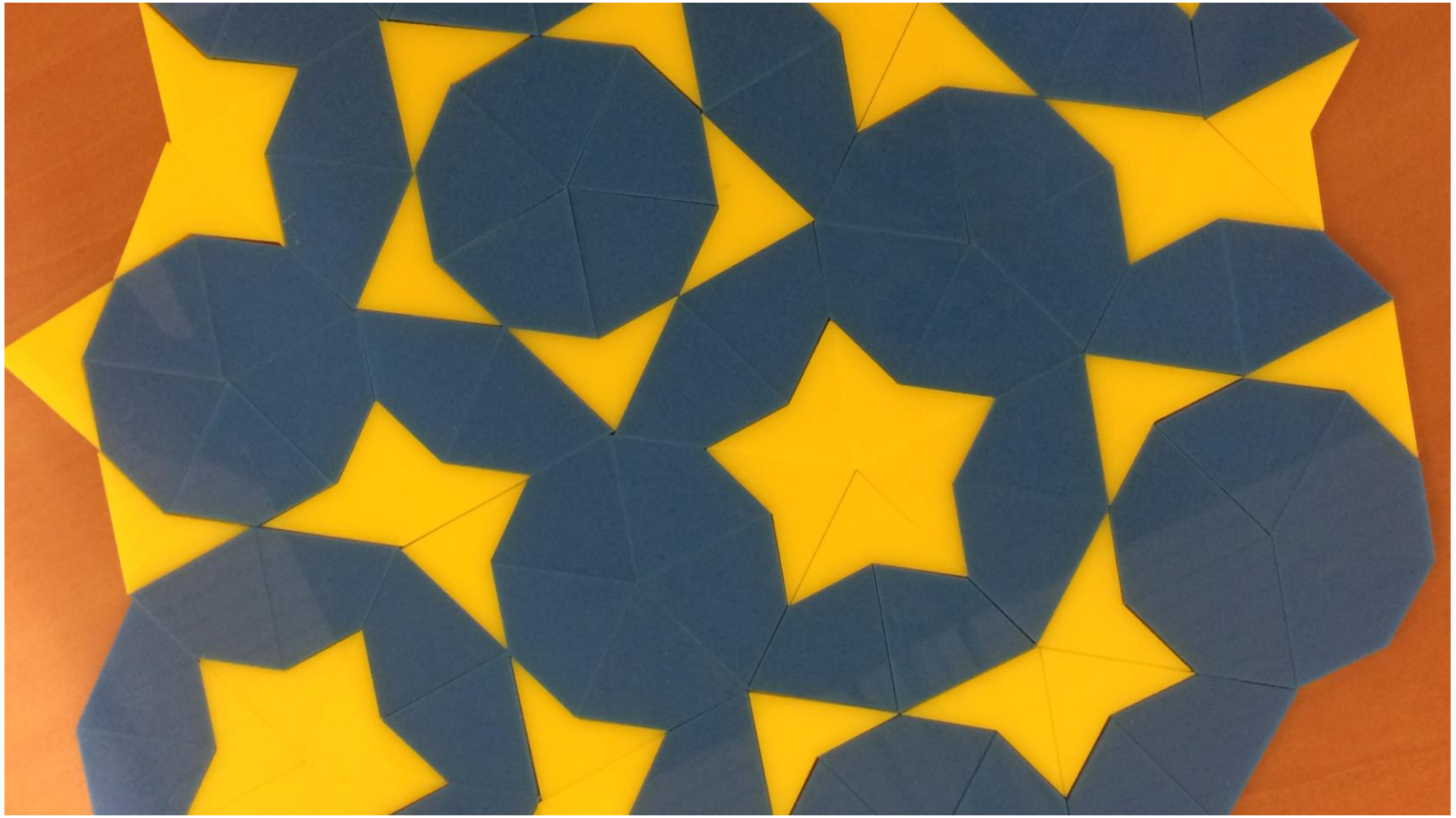
A wallpaper pattern is a pattern with **translation symmetry** in two directions.

A wallpaper pattern is made up of a combination of the following symmetries: rotation, reflection, and glide reflection.

An arrangement in one direction is a frieze, friezes stacked upon one another to fill the entire plane form a wallpaper pattern

Penrose is a tessalation but not a wallpaper pattern

it is called semi-periodic



Wallpaper patterns

While it may seem like there are infinitely many ways to tile the plane, there are in fact only 17 (mathematically) distinct patterns.

Two identical patterns

(identical symmetrie-groups)

Wallpaper patterns

Patterns are formed by combinations of the different transformation

Discovering wallpaper patterns with

- Hand-out, p2-3, description of the 17 types
- Morenaments, p4

Make your own pattern

- Or Escher pattern

(https://wiskunde-interactief.be/3meet_6vlakv_vlak.htm)